

Software Testing and Quality Assurance

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- Something about this course
 - Academic degree course
 - English&Chinese teaching & learning
 - Some rules: attendance/homework/exercises
 - The references

考勤班长：钟晨瑗

[考勤管理细则](#)

Software Testing and Quality Assurance

The screenshot shows a web browser displaying a course page for "Software Testing" (《软件测试》) on the Zhihuishu platform. The URL is https://coursehome.zhihuishu.com/courseHome/1000002143?cparams=JTDCTlyY291cnNISWQlMjI6MT/. The page features a blue header with the course title and a subtitle indicating it's a Computer Science class (计算机类 (0809)). A large image on the left shows a computer screen with code and a globe, with text asking if you want to understand the future development of software testing. The course introduction section on the right provides details: credits (学分) 1.0, teaching hours (学时) 18.0, teachers (教师) Zhang Xiaofang, Cheng Baile, and Qu Yanyi, and the university (学校) Suzhou University. A "More" button (了解更多) is located at the bottom right. The browser interface includes a back/forward navigation bar, a search bar, and a tab for the current page.

Software Testing and Quality Assurance

The screenshot shows a web browser window displaying a course page for "Software Testing". The title bar reads "视频检查_智慧树" and the URL is <https://courseh5.zhihuishu.com/cc.html#/chapterVideo/1000002143/0/1?cparams=JTkCJTyY291cnNISW>. The main content area is titled "《软件测试》" and shows a video player for "3.1 白盒测试的基本概念". The video thumbnail features the text "白盒测试" and "白盒测试的基本概念" over a digital background, with "主讲老师: 程宝雷" below it. Below the video are numbered thumbnails from 1.1 to 4.2.2. A progress bar at the bottom indicates completion at 57% (+ 3.6K/s). To the right of the video player is a "反馈记录" section containing two entries:

[视频 00:05:17]
139****7865在2020-12-16 20:29提交
这边520的20应该是指数，代表5的20次方
处理结果：已处理
处理人：方园
[视频 00:05:14]
139****7865在2020-11-06 20:37提交
520不对，20为上标，表示的意思是5的20次方
处理结果：已处理
处理人：方园

- The contents
 - Introduction of STQA
 - Basic concepts of ST
 - Testing methods: Wh
 - Testing phases: U-I-S
 - Testing report
 - Testing metrics

-  STQA_Session_01_Introduction
-  STQA_Session_02_Preliminary
-  STQA_Session_03_Logic coverage
-  STQA_Session_04_Control flow graph
-  STQA_Session_05_Basic path testing
-  STQA_Session_06_Loop testing&Data flow t...
-  STQA_Session_06-plus--Data flow testing
-  STQA_Session_07_BVA
-  STQA_Session_08_EP
-  STQA_Session_09_DT
-  STQA_Session_10_CEG
-  STQA_Session_11_CT
-  STQA_Session_12_UISA
-  STQA_Session_13_Regression testing
-  STQA_Session_14_Performance testing
-  STQA_Session_15_Bug report
-  STQA_Session_16_Testing metrics
-  STQA_Session_17_Testing management

- Score?
- Course objectives?
 - Application in graduation project
 - Publication of papers

Session 1

Introduction of Software Quality Assurance and Software Testing

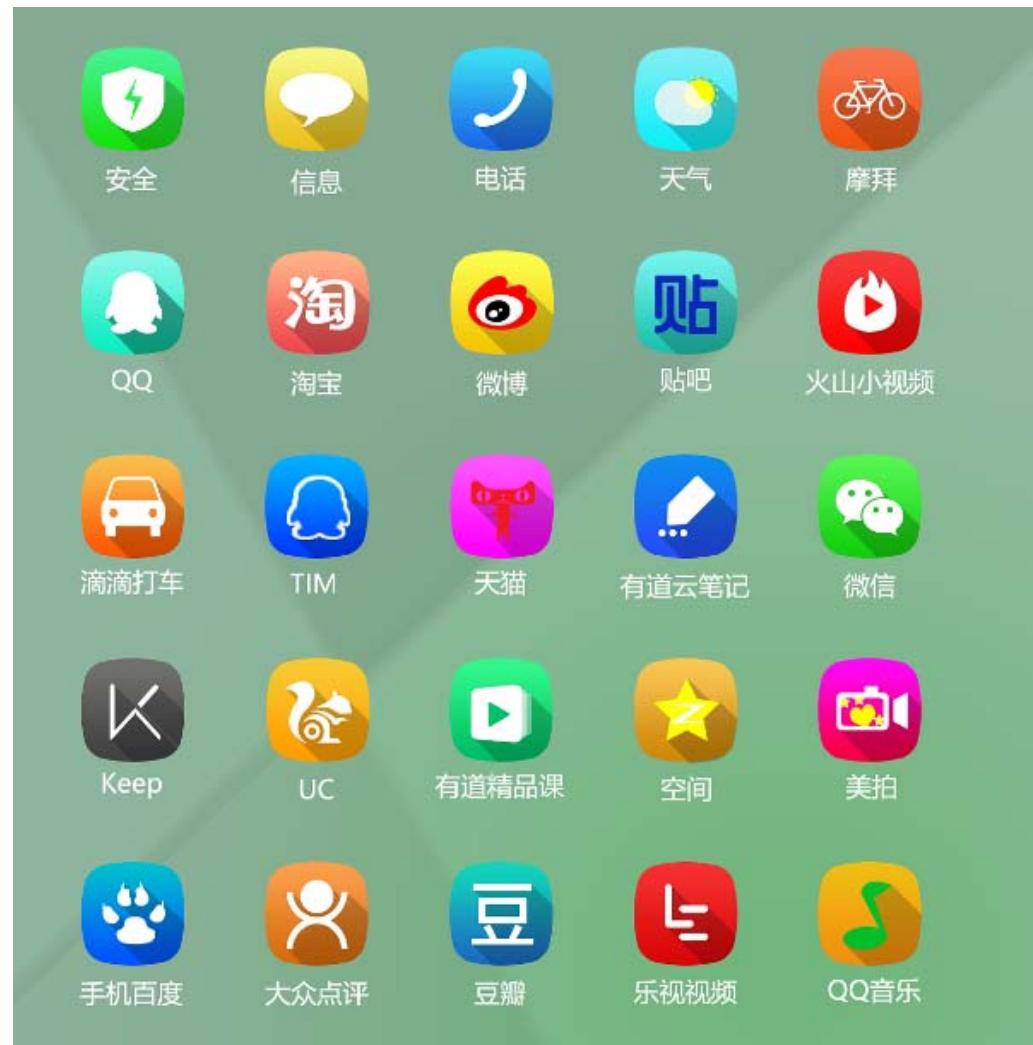
Objectives

- ◆ In this session, you will learn:
 - ◆ The basic idea of SQA
 - ◆ Quality assurance and quality control
 - ◆ Testing overview

- ◆ Why we need software testing?

Software Testing and Quality Assurance

◆ We need software



软件的组成部分有哪些? ()

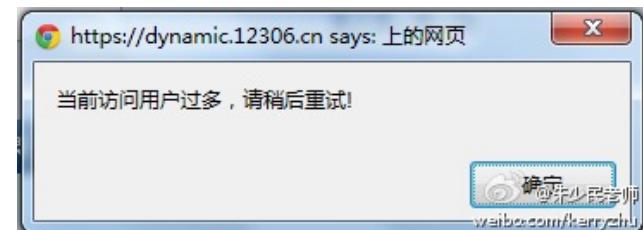
- A. 计算机程序
- B. 计算机程序和文档
- C. 计算机程序和规程
- D. 计算机程序、规程以及可能的相关文档和运行计算机系统所需的数据

- ◆ We need software of good quality

08奥运票务中心、12306的道歉



2007年10月30日，北京奥运会第二阶段门票销售刚启动就因为购票者太多而被迫暂停。低估了群众购票的热情，导致售票系统出现了瓶颈问题



一个缺陷造成了数亿美元损失

$$(4195835 / 3145727) \times 3145727 - 4195835 = ?$$



最后 **Intel**公司付出很大代价，回收**CPU**，造成
4亿美元损失

波音737 MAX 软件故障





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— 庚子鼠年
— 农历初一

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今天

日历

收件箱

晚上7:30

4G

评论：徽商银行

全部

好评(8)

差评(49)

斗登陆不上

★★★★★

我小鱼 11-22 3.3.6版本

不怎么好用

★★★★★

用户31713 11-19 3.3.6版本

真不知道给差评的人是怎么弄的，我用着都挺好，功能都很精致，恶意攻击在秀人品下限还是根本就是人品太差？

★★★★★

吃猪侠 10-08 3.3.5版本

垃圾，转账之后，钱到了，却没有当天的记录，看不放当天的转账记录啊，竟然要延迟2天才有，所有银行也只有徽商银行这样吧。

★★★★★

松林海浪 09-15 3.3.4版本

垃圾，这就是在浪费时间，

★★★★★

月儿 09-14 3.3.4版本

太垃圾

★★★★★

卓寒 07-31 3.3.3版本



评论

- ◆ We need some methods to ensure the quality

软件错误

在软件生命周期内不希望或不可接受的人为错误，结果导致软件缺陷的产生

软件缺陷

缺陷存在于软件及相关的文档中，在特定的条件下会使软件产生故障

软件故障

软件处于一种不希望或不可接受的内部状态，不及时处理就会使软件失效

软件失效

软件处于一种不希望或不可接受的外部状态

- 软件中存在的缺陷给我们带来的损失是巨大的，这也说明了软件测试的必要性和重要性
- 测试是所有工程学科的基本组成单元，自然也是软件开发的重要组成部分
- 测试人员水平越高，找到软件问题的时间就越早，软件就越容易更正，产品发布之后越稳定，收益越大

Software Testing and Quality Assurance



微信号: QualityReport

- Eating your own dog food, *Dogfooding*
- 自己公司使用自己开发的产品
 - 1988 年，微软的高管 Paul Maritz 在写给测试主管的一封邮件中

故事1:二战期间，美国空军降落伞的合格率为99.9%，这就意味着从概率上来说，每一千个跳伞的士兵中会有一个因为降落伞不合格而丧命。军方要求厂家必须让合格率达到100%才行，厂家负责人说他们竭尽全力了，99.9%已是极限，除非出现奇迹，军方就改变了检查制度，要求厂家负责人亲自跳伞检测。从此，奇迹出现了，降落伞的合格率达到了百分之百。

都吃一罐自己公司的狗粮。

- 二战期间降落伞
- 百度无人车

[李彦宏 - 百度百科](#)



职业：百度董事长兼首席执行官

生日：1968年11月17日

主要成就：发明超链分析技术并获美国专利，商业周刊2006年全球最...

简介：[李彦宏](#) (Robin Li)，男，汉族，无党派人士，1968年...

人物经历 社会兼职 社会活动 出版图书 荣誉成就 更多 >

百度百科

Fundamentals of Software Quality Assurance

- ◆ Quality is defined as the degree of excellence of a software.
- ◆ Quality can be interpreted as meeting the following customer requirements:
 - ◆ Explicit
 - ◆ External: features, usability
 - ◆ Implicit
 - ◆ Internal: maintainability, user experience

Introducing Software Quality Assurance

- ◆ To ensure quality in the software development process, you need to implement software quality assurance activities in **each phase** of the Software Development Life Cycle (SDLC).
- ◆ SQA is a **planned** and **systematic** approach for **monitoring and improving** the software development process.
- ◆ SQA processes evaluate the **adherence** of a software product to software product standards.

Introducing Software Quality Assurance (Contd.)

- ◆ SQA Activities in Various Phases of the SDLC:
 - ◆ Software conception and initiation
 - ◆ Analysis
 - ◆ Design
 - ◆ Construction
 - ◆ Testing

Introducing Software Quality Assurance (Contd.)

- ◆ To ensure that the quality assurance objectives are met, a project **SQA (P11) plan** is created.
 - ◆ A part of comprehensive project plan
 - ◆ Specifies the QA procedure
 - ◆ Assigns roles and responsibilities
 - ◆ Plan-Do-Check-Action

Quality Assurance and Quality Control

- ◆ Quality activities can be segmented into two categories:
 - ◆ Preventive activities
 - ◆ Detective activities

Quality Assurance and Quality Control

- ◆ QA is oriented to the **prevention** of defects rather than their detection and is used to implement the defined quality policy of an organization **through the process** of development and continuous improvement.

Quality Assurance and Quality Control (Contd.)

- ◆ Quality Assurance (QA) activities include:
 - ◆ Quality Audit
 - ◆ Process definition
 - ◆ Tool selection
 - ◆ Training
 - ◆ Peer review
 - ◆ Requirements tracking
 - ◆ Quality metrics collection
 - ◆ ...

Quality Assurance and Quality Control (Contd.)

- ◆ Quality Control (QC) is the process by which the quality of a product is **compared with specific standards**, and action is taken if the quality does not match the applicable standards.
- ◆ QC is oriented to **detection** of defects rather than prevention.

Quality Assurance and Quality Control (Contd.)

- ◆ QC activities include:
 - ◆ Inspection
 - ◆ Testing
 - ◆ Checkpoint review
 - ◆ ...
 - ◆ QA VS. QC

Testing Overview

- ◆ **What is testing ?**
- ◆ **Who does testing ?**
- ◆ **When to Start testing ?**
- ◆ **When to Stop testing ?**

- ◆ **5W+1H**

Testing Overview

- ◆ What is testing ?

According to ANSI/IEEE 1059 standard, Testing can be defined as

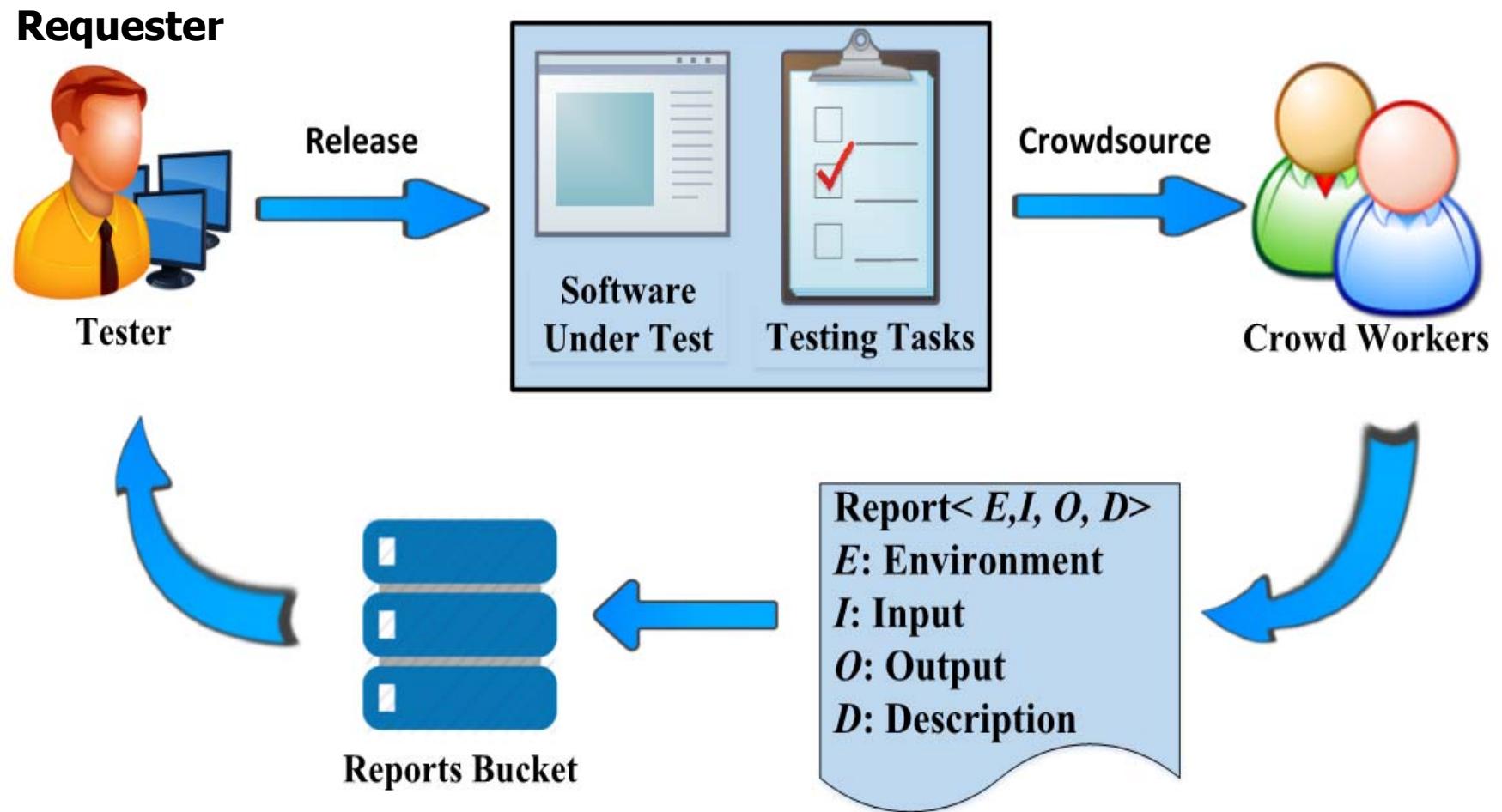
*A process of analyzing a **software item** to **detect** the differences between existing and required conditions (that is defects/errors/bugs...) and to **evaluate** the features of the software item.*

Testing is everywhere

Testing Overview

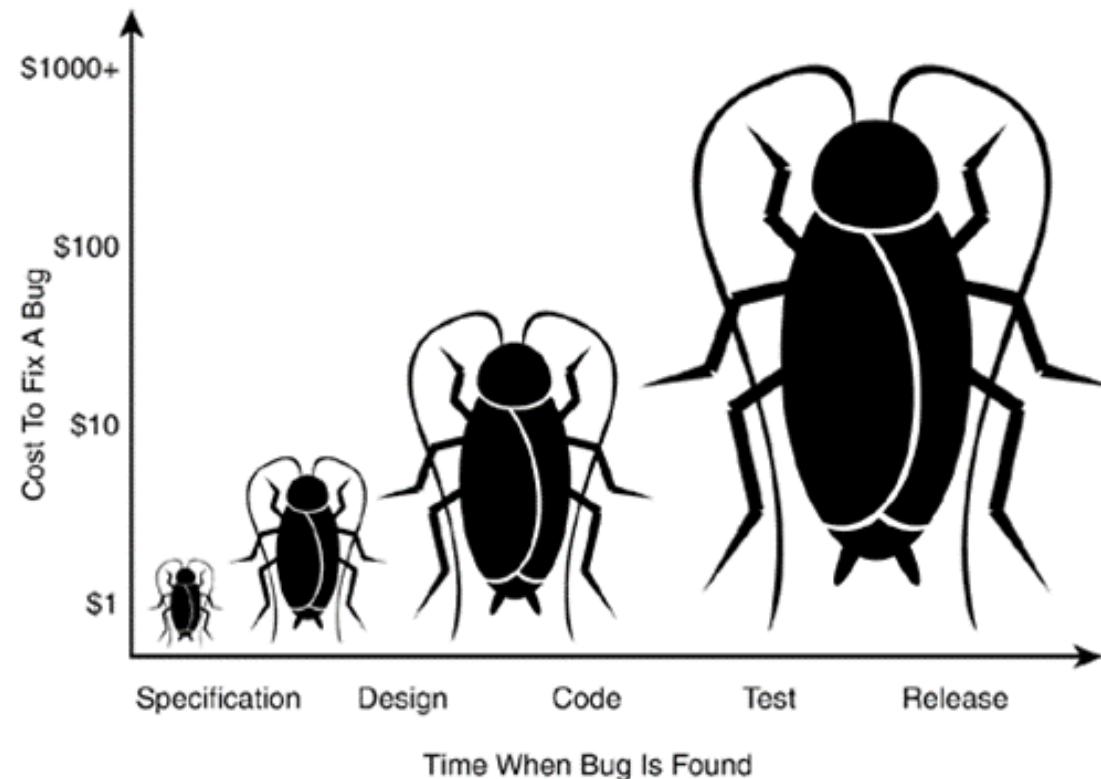
- ◆ Who does testing ?
 - ◆ Software Tester
 - ◆ Software Developer
 - ◆ Project Lead/Manager
 - ◆ End User
- ◆ Crowdsourcing Testing
 - ◆ Anyone—crowd worker

Crowdsourcing Testing(众包测试)



Testing Overview

- ◆ When to Start Testing ?
 - ◆ The earlier, the better



Testing Overview

- ◆ When to Start Testing ?
 - ◆ The earlier, the better
 - ◆ Depends on the development model
 - ◆ Waterfall model vs. incremental model
 - ◆ Testing is done in different forms at every phase of SDLC

Testing Overview

- ◆ When to Stop Testing ?
 - ◆ Testing is a never ending process
 - ◆ Some aspects
 - Testing Deadlines.
 - Completion of test case execution.
 - Completion of functional and code coverage to a certain point.
 - Bug rate falls below a certain level and no high priority bugs are identified.
 - Management decision.

Summary

- ◆ The need of SQA & Testing
- ◆ The basic idea of SQA
- ◆ Difference between quality assurance and quality control
- ◆ Testing overview

◆ A question:

Testing is a subset of quality assurance or
quality control?